

wherein the actuator operates to pivot the first jaw about the pivotal axis
and move the first jaw into contact with the second jaw, wherein each
of the first and second jaws includes a generally U-shaped
configuration defining a center point and having a distalmost end, and
wherein an edge of the distalmost end of one of the jaws includes
teeth radially disposed about the center point, and an edge of the
distalmost end of the other jaw includes at least one tooth.

34. The device according to claim 33, wherein the second jaw is pivotally disposed
about the pivotal axis and with respect to the first jaw so that the jaws mate upon
pivotal movement.
35. The device according to claim 34, further comprising a clevis pin, wherein the
pivotal axis is defined by the clevis pin.
36. The device according to claim 33, wherein the teeth of the one of the jaws and at
least one tooth of the other jaw have a substantially triangular shape.
37. The device according to claim 36, wherein the teeth of the one of the jaws and
the at least one tooth of the other jaw are configured to mate.
38. The device according to claim 37, wherein the teeth of the one of the jaws are
displaced by one half pitch from the at least one tooth of the other jaw.
39. The device according to claim 33, wherein the first and second jaws have a
generally elongated hemispherical shape.
40. The device according to claim 33, wherein the first jaw has a tang defining a first
bore.

91
FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

41. The device according to claim 40, further comprising a first pull wire positioned within the hollow portion, the first pull wire connecting the first jaw to the actuator and engaging the first bore, wherein a distal end of the first pull wire passes through and beyond the first bore and terminates without forming a loop.
42. The device according to claim 41, further comprising a second pull wire positioned within the hollow portion and connecting the second jaw to the actuator.
43. The device according to claim 42, wherein the second jaw has a tang defining a second bore and the second pull wire engages the second bore, a distal end of the second pull wire passing through and beyond the second bore and terminating without forming a loop, the actuator operating to pivot the second jaw about the pivotal axis.
44. The device according to claim 43, wherein the distal end of the second pull wire includes a main portion which extends in the direction of the actuator, a first portion which passes through the second bore at an angle to the main portion, and a second portion on the opposite side of the second bore relative to the main portion, the second portion of the second pull wire maintaining the second pull wire on the tang, the second pull wire terminating on the second portion.
45. The device according to claim 42, wherein the actuator includes a handle being coupled to the first and second pull wires.
46. The device according to claim 45, wherein the handle includes a central shaft and a spool slidably disposed around the central shaft, the spool engaging the

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

first and second pull wires, the spool operable to move the first and second pull wires relative to the central shaft.

47. The device according to claim 42, wherein the first and second pull wires are positioned within the hollow portion for a substantial length of the hollow portion.
48. The device according to claim 41, wherein the distal end of the first pull wire includes a main portion which extends in the direction of the actuator, a first portion which passes through the first bore at an angle to the main portion, and a second portion on the opposite side of the first bore relative to the main portion, the second portion of the first pull wire maintaining the first pull wire on the tang, the first pull wire terminating on the second portion.
49. The device according to claim 48, wherein the first pull wire is bent between the main portion and the first portion and between the first portion and the second portion.
50. The device according to claim 49, wherein the first portion of the first pull wire which passes through the bore is rotatable relative to the surface of the bore.
51. The device according to claim 33, wherein the hollow portion is a coil.
52. The device according to claim 33, further comprising a needle disposed between the first and second jaws.
53. An end effector assembly for use in a biopsy forceps device including an actuator at a proximal end of the device and a hollow portion connecting the actuator to the end effector assembly, the end effector assembly comprising:
a first jaw; and

91
FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

a second jaw for mating with the first jaw, wherein the first jaw is pivotally disposed with respect to the second jaw about a pivotal axis, and each of the first and second jaws includes a generally U-shaped configuration defining a center point and having a distalmost end, and wherein an edge of the distalmost end of the first jaw includes teeth radially disposed about the center point, and an edge of the distalmost end of the second jaw includes at least one tooth disposed at a portion thereof.

54. The assembly according to claim 53, wherein the second jaw is pivotally disposed about the pivotal axis and with respect to the first jaw so that the jaws mate upon pivotal movement.
55. The assembly according to claim 54, further comprising a clevis pin, wherein the pivotal axis is defined by the clevis pin.
56. The assembly according to claim 54, wherein the second pull wire is bent between the main portion and the first portion and between the first portion and the second portion.
57. The assembly according to claim 56, wherein the first portion of the second pull wire which passes through the second bore is rotatable relative to surface of the bore.
58. The assembly according to claim 53, wherein the teeth of the first jaw and the at least one tooth of the second jaw have a substantially triangular shape.
59. The assembly according to claim 58, wherein the teeth of the first jaw and the at least one tooth of the second jaw are configured to mate.

al

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

60. The assembly according to claim 59, wherein the teeth of the first jaw are displaced by one half pitch from the at least one tooth of the second jaw.
61. The assembly according to claim 53, wherein the first and second jaws have a generally elongated hemispherical shape.
62. The assembly according to claim 53, wherein the first jaw has a tang defining a first bore for receiving a first pull wire.
63. The assembly according to claim 53, wherein the second jaw has a tang defining a second bore for receiving a second pull wire.
64. The assembly according to claim 53, further comprising a needle disposed between the first and second jaws.
65. A biopsy forceps device having a proximal end and a distal end, the device comprising:
an end effector assembly at the distal end of the device, wherein the end effector assembly includes a first jaw and a second jaw, the first jaw being pivotally disposed relative to the second jaw, the first jaw having an array of teeth, the second jaw having at least one tooth;
an actuator at the proximal end of the device; and
a hollow portion connecting the end effector assembly and the actuator,
wherein the actuator operates to pivot the first jaw relative to the second jaw and move the first and second jaws so that the array of teeth of the first jaw engages the at least one tooth of the second jaw along an edge.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

wherein the edge of each of the jaws includes a first side portion, a second side portion on an opposite side of the first side portion and a third distalmost portion connecting the first side portion to the second side portion, the third distalmost portion having a curved configuration.

66. The biopsy forceps device of claim 65, wherein the third distalmost portion of the edge is semicircular so that the teeth on the third distalmost portion of the first jaw are radially disposed about a point.
67. The biopsy forceps device of claim 66, wherein the teeth of the first jaw and the at least one tooth of the second jaw are positioned on at least one of the side straight portion, the second side portion, and the third distalmost portion of the edge.
68. The biopsy forceps device of claim 67, wherein the teeth of the first jaw are displaced by one-half pitch from the at least one tooth of the second jaw.
69. The biopsy forceps device of claim 66, wherein the teeth of the first jaw are displaced by one-half pitch from the at least one tooth of the second jaw.
70. The biopsy forceps device of claim 65, wherein the teeth of the first jaw and the at least one tooth of the second jaw are positioned on at least one of the first side portion, the second side portion, and the third distalmost portion of the edge.
71. The biopsy forceps device of claim 65, further comprising a clevis pin defining a pivotal axis about which the first jaw pivots relative to the second jaw.
72. The biopsy forceps device of claim 65, further comprising a needle disposed between the first and second jaws.


FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

73. The biopsy forceps device of claim 65, wherein each of the first side portion and the second side portion is substantially straight.

74. An end effector assembly for use in a biopsy forceps device including an actuator at a proximal end of the device and a hollow portion connecting the actuator to the end effector assembly, the end effector assembly comprising:

a first jaw; and

a second jaw for mating with the first jaw, wherein the first jaw is pivotably disposed with respect to the second jaw about a pivotal axis, and each of the first and second jaws includes a distalmost portion having a generally curved configuration, and wherein a curved edge of the distalmost portion of the first jaw includes teeth and a curved edge of the distalmost portion of the second jaw includes at least one tooth.

75. The end effector assembly of claim 74, wherein each of the first and second jaws has an edge that includes the curved edge of the distalmost portion, a first substantially straight portion, and a second substantially straight portion on the opposite side of a longitudinal axis of the end effector assembly from the first substantially straight portion, said curved edge of the distalmost portion connecting the first substantially straight portion to the second substantially straight portion.

76. The end effector assembly of claim 75, wherein the curved edges of the first and second jaws are semicircular so that the teeth of the first jaw and the at least one tooth of the second jaw on the distalmost portion are radially disposed about a point.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com